

# Priority Goals & Actions

## Preserving Our Unique Resources

Not only is the Black-Buffalo-Trempealeau River Basin home to numerous resources that are considered rare and unique in Wisconsin, but there is also a large number of resources that are rare and threatened within the basin. Protection of rare vegetation, wildlife, landforms, ecosystems, and other resources is vital to supporting the diversity of life in this basin.

While the focus of the Wisconsin Department of Natural Resources (WDNR) has typically been environmental, other resources cannot be ignored. Cultural and historical resources abound

in this region. Numerous Native American tribes protect sacred ground here. Only the Ho-Chunk Nation remains in any significant numbers. Many, from historical societies to schoolchildren, reflect on those who came before, and how and where they made their mark.

Still other resources require a different sort of preservation.

Areas with unique geographical resources, water bodies, and

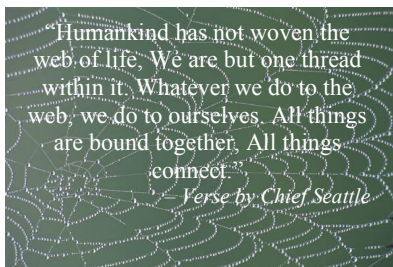
forest types can be purchased and the land made into parks for all to share. Time and weather may take their toll on the geography of the land, but by creating parks, the state can protect the unique landforms and ecosystems from unnecessary human disturbance for many generations to come.

Finally, with positive management of the land and water and with close consideration of past mistakes and abuses, living resources like wildlife, plant life, and aquatic life of the basin can also be well maintained. Invasive species will play their role, of course, but with hard work from the WDNR and community members, these too can be controlled.

Each species helps to support the balance of its respective ecosystem and vice versa. So when we protect the oak savannas in the Black-Buffalo-Trempealeau River Basin, we protect the lupine. When we protect the lupine, we protect the Karner blue butterfly. We not only protect the Karner blue, but an entire interdependent community of associated plants and animals, as well as an aesthetic, which has long been valued in this country, state, and region.

### The BBT's Unique Resources - At a Glance

- 604 miles (17% of total miles) of designated cold water streams drain the basin.
- Of the 82 lakes and impoundments in the basin, only 20 are naturally occurring waterbodies, all of which are found in Taylor County.
- Only 287,464 acres of wetlands remain in the basin. That is only 11% of a basin highly prone to flooding and streambank erosion.
- 62% of the fish species that are listed as endangered, threatened, or special concern in Wisconsin can be found in the BBT.
- Some of the roughest terrain in the state can be found in Buffalo County.
- The basin's three major tributaries discharge through the Trempealeau or Upper Mississippi River national wildlife refuges.



## Wetlands

- Simply put, the presence of wetlands can be determined by –
- the hydric (containing water, poorly drained) state of the soil.
  - the species of plant life that survive in soils that are seasonally saturated to inundated with water.
  - the physical presence of water within twelve inches of the surface of the soil.

Variables in each of these three categories create a wide variety of wetlands like forested, meadows, thickets, marshes, swamps, bogs, fens, and open water.

Wetland types can serve different purposes. All are valuable. Many wetlands act as breeding grounds for fish and migratory birds. Wetlands play a vital role in the process of keeping our groundwater supply clean and drinkable. They also protect the land from erosion and help capture or slow runoff to reduce the impacts of flooding.

For these reasons and more, many in Wisconsin were concerned when the U.S. Supreme Court made a ruling early in 2001 that removed federal protection from certain small wetlands around the country. Such a precedent made it possible for anyone to drain or fill wetlands on their property to build a pond or to prepare land for agriculture without regard for the natural state of the wetland.

Wisconsin showed its commitment to the protection of wetlands by becoming the first state to pass a law, only five months after the Supreme Court ruling, giving the state power to regulate the filling of these treasured ecosystems.

Two specific types of wetlands are endangered both statewide and globally. The first, bog relicts, are rare wetlands, remnants of the Ice Age, found in the driftless area. The best known remaining examples are located in the Tamarack Creek Bog in Trempealeau County and the Big Swamp Wildlife Area in Buffalo County. Bog relicts include some acid-loving plants like sphagnum moss, certain sedges and shrubs, and insectivorous herbs. Some trees like tamarack and poison sumac can also be found.

The second is the Coastal Plain Marsh, which is most often “found around the shores of shallow lakes that fluctuate wildly in the amount of water they hold” (Hoffman, 2001) leading us to believe that their value is in shoreline protection and flood control. Many Coastal Plain Marshes can be found east of Black River Falls.

To learn more about Wisconsin wetlands, visit:  
<<http://www.dnr.state.wi.us/org/water/fhp/wetlands/>>.

## The Values of Wetlands:

- Fish & Wildlife Habitat
- Flood Protection
- Water Quality Protection
- Shoreline Protection
- Groundwater Recharge & Discharge
- Aesthetics, Recreation, Education, & Science

A wetland in Jackson County.



Courtesy of Jackson County Historical Society



### What the WDNR Is Doing

In December 2000, the WDNR's Wetland Team developed a strategic plan, called *Reversing the Loss*, for protecting and restoring wetlands in Wisconsin. In this plan, the Team identified the following nine goals to work toward for the future of Wisconsin's wetlands:

- ➔ Outreach & technical assistance for wetland stewardship.
- ➔ Incentives for wetland stewardship.
- ➔ Managing for biodiversity, health, and integrity.
- ➔ Protecting wetland ecosystems through acquisition.
- ➔ Restoring wetlands.
- ➔ Managing & enhancing wetlands for specific functions.
- ➔ Simplifying regulation & enforcement.
- ➔ Compensatory mitigation.
- ➔ Using technology to map, monitor, protect, & manage wetlands.

Common Classes	Total Acres	% of Total Acreage
Aquatic Bed	1,995	1%
Forested	70,848	25%
Scrub/Shrub	42,682	15%
Emergent/Wet Meadow	58,837	20%
Wet	24,417	8%
Total "Mixed" Classes	88,685	31%
<b>Total Wetlands</b>	<b>287,464</b>	<b>100%</b>

Table 2 – Wetlands in Acres in the BBT; Mixed classes are combinations of one or more of the above listed common classes.

In the BBT, wildlife biologists have been working toward these goals with projects like seeding wetlands with wild rice and removing Range Line Flowage Dam, which filled a wetland area in Jackson County. In addition, especially in areas of rare, high-quality wetlands, exotic species are being removed and recreational use is limited to passive forms. For example, motorized vehicles might tear up terrain while hiking would not.

Waterway and Wetland Permitting staff take a different role in wetlands protection. When landowners are interested in dredging or filling their land for ponds or other development, a permit is needed, and Waterway and Wetland Permitting staff assess the area in question. If the area is determined to be a wetland, in the interest of protecting the ecosystem, a permit is usually not issued. If the landowner is interested, the staff members can then offer suggestions about ways to increase wildlife and enhance wetland beauty.

### What You Can Do

- ➔ *Who to contact:* Water Management Specialist or Wildlife Biologist, (715) 284-1400.
- ➔ Request the "Recognizing Wetlands" pamphlet from the U.S. Army Corps of Engineers at (608) 784-8236.
- ➔ Request the "Building near Wetlands" publication from the WDNR. Call (715) 284-1400.
- ➔ Visit *Wetland Restoration Handbook for Landowners* at <<http://www.dnr.state.wi.us/org/water/fhp/wetlands/resman.htm>>.
- ➔ Teachers, find out more about Project WET curriculum and activity guide (K-12) by calling (715) 346-4978 or visiting <<http://www.uwsp.edu/cnr/uwexlakes/wet/>>.
- ➔ To join the Wisconsin Wetlands Association (WWA), contact WWA, 222 South Hamilton Street, Suite #1, Madison, WI 53703, e-mail <[wetlands@execpc.com](mailto:wetlands@execpc.com)> or visit <<http://www.wiscwetlands.org>>.
- ➔ For information on Community Water Education and Action opportunities, visit <<http://www.dnr.state.wi.us/org/caer/ce/bureau/education/reslst.htm>>.

Over 75% of Wisconsin's wetlands are privately owned, making private landowners the key in protecting wetland habitats.

Cost-share programs available to wetland landowners:

- ➔ **Wetland Reserve Program** – voluntary program provides cost sharing opportunities to restore wetlands. Contact Wetland Reserve Program Coordinator (608) 276-8732, ext. 222, <<http://www.nhq.nrcs.usda.gov/PROGRAMS/wrp/>>, or NRCS County Office.
- ➔ **Conservation Reserve Program** – program allows federal government to enter contracts with agricultural producers to remove key lands from production for annual rent payments. For more information: <<http://www.fsa.usda.gov/dafp/cepd/crpinfo.htm>>.

## Threatened Forest Communities

It would be easy to look around the Black-Buffer-Trempealeau River Basin and say that there is no shortage of forestland, especially considering the Black River State Forest and the large tracts of county forests. However, there are numerous special forest communities that are in danger. The loss of such natural communities would mean losing more than the communities. It would mean the loss of another small piece of the biodiversity in this region and state, and it would also mark the loss of many of the rare plant and animal species that depend on the communities.

Because natural communities including forest types are not legally protected, many of the threats to them persist today. Some threats to natural communities are fragmentation of the land, suppression of forest fire, and shoreline/streambank development. Poor land management practices like improper harvesting of timber and over-use of land-spread pesticides and herbicides also harm the land. Finally, the problem of invasive species is not a new one to the basin, but it is becoming more of a threat to rare species and the communities that support them.

One such natural community is the oak savanna, which is frequently grouped with tallgrass prairies. Today, most barrens, a type of savanna, exist in small parcels on state or federal land. They typically occur in sandy soils and are dominated by grasses and, in oak barrens, oak trees (Finan, 2000).

Early in the 20<sup>th</sup> Century, the lands that were oak savannas were fragmented. Most of the oak savannas from before that time were cleared and plowed, over- or under-grazed, filled in by dense shrubbery and trees because of lack of fire, or any combination of these (Henderson, 1995).

For those savannas that remained, continued fire suppression became the problem with which to contend. Oak tends to be a slow-growing, fire resistant species because of its thick bark. When fires sweep through a savanna, they typically burn out the pine and other fast-growing species. When fires are suppressed, there is nothing to prevent these species from quickly growing taller than and shading out the oak trees and grasses that make up the oak savanna.

Losing these ecosystems is tragic in its own right, but it also means the loss of numerous species of plant and animal life that depend on them. The plant, lupine, depends on oak barrens for its survival. The Karner Blue butterfly, in turn, depends on lupine for its reproduction and the survival of its species.

While many of the other plants most often related with oak savannas are not currently considered rare or endangered, the combination of them certainly is. Though some other natural communities may support some of the same species, the balance of life represented by oak savannas cannot be replicated.

*Oak savanna* – an ecosystem bordered by the prairies of the west and the deciduous forest of the east.

*“Oak savanna now shares equal billing with tallgrass prairie as the most threatened plant community in the Midwest and among the most threatened in the world. Intact examples of oak savanna vegetation are now so rare that less than 500 acres are listed in the Natural Heritage Inventory as having plant assemblage similar to the original oak savanna. This is less than 0.01% of the original 5.5 million acres.”*

– by Richard Henderson



Oak barrens found at Perrot State Park in Trempealeau County.



### *What the WDNR Is Doing*

The Wisconsin Department of Natural Resources is currently waiting to see if the Natural Resources Board approves the Karner blue butterfly recovery plan. If that happens, the WDNR will begin actively managing certain areas for oak savannas and oak barrens. If they do not approve the plan, then it will be up to the public to protect this valuable resource, with the experience and knowledge of the WDNR at their disposal.

Another rare forest type found in the basin, the white pine–red maple swamp, occurs almost exclusively along the western edge of former Glacial Lake Wisconsin, mostly in Juneau and Jackson Counties. White pine and red maple are the dominant species, but many other trees, shrubs, herbs, and mosses are present. Because this community survives on the extinct lake, it is rated as imperiled in Wisconsin because of its rarity and/or vulnerability to possible extirpation in the state. The Bureau of Endangered Resources and related WDNR staff work to maintain the swamps by removing

exotic species in them and limiting recreation in the area to passive forms, like hiking or bird-watching.

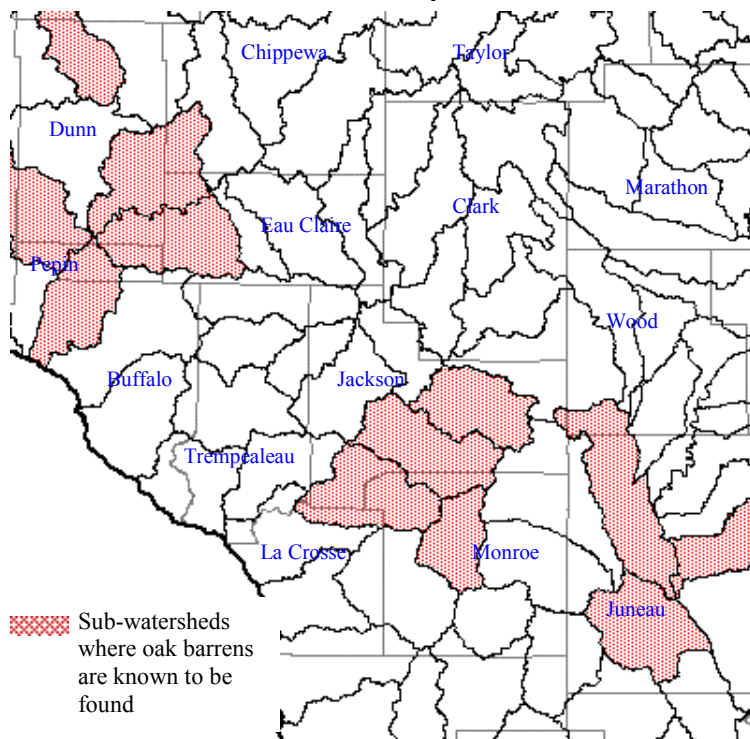


Figure 5 – Locations of Known Oak Barrens by Sub-watershed; Courtesy of the National Heritage Inventory database.

Visit the natural areas in your county. They are:

- ➔ Blue Swamp – Clark
- ➔ Brady's Bluff Prairie – Trempealeau
- ➔ Castle Mound Pine Forest – Jackson
- ➔ Jay Creek Pine Forest – Jackson
- ➔ Ketchum Creek Pines – Jackson
- ➔ Midway Railroad Prairie – La Crosse
- ➔ La Crosse River Trail Prairie – La Crosse
- ➔ Robinson Creek Pines – Jackson
- ➔ Twin Lakes Bog – Taylor

### *What You Can Do*

- ➔ Learn more about natural communities in Wisconsin and about what natural communities are in your county by visiting <[http://www.dnr.state.wi.us/org/land/er/rare/natcomm\\_descriptors.htm](http://www.dnr.state.wi.us/org/land/er/rare/natcomm_descriptors.htm)>.
- ➔ Learn about state natural areas in your county <<http://www.dnr.state.wi.us/org/land/er/snas/bycountylist.htm>>.
- ➔ Teachers, find out more about Project Learning Tree by calling (202) 463-2468.
- ➔ Forest management publications are available at (608) 262-2655 or <<http://www.uwex.edu/ces/pubs>>.
- ➔ To get assistance managing your woodlands, contact your county WDNR forester, visit <<http://www.dnr.state.wi.us/org/land/forestry/ftax/COUNTY.HTM>>, or contact Wisconsin Forest Productivity Council at (715) 369-3475.
- ➔ For more information about the Managed Forest Law, a tax saving program related to timber production, call (608) 266-3545 or visit <<http://www.dnr.state.wi.us/org/land/forestry/ftax/>>.
- ➔ Cost sharing is available through the Forestry Incentive Program. For more information, call your county WDNR forester or your county NRCS Office, or visit <<http://www.wi.nrcs.usda.gov/>>.

## Aquatic Habitats

The Black-Buffalo-Trempealeau River Basin (BBT) includes many unique and rare aquatic habitats. Natural channel streams, or streams whose paths have not been channelized at any point in their meandering, are rare statewide, but many are located in the basin.

Some of these natural channel streams are Outstanding and Exceptional Resource Waters (ORWs/ERWs). ORWs are lakes or streams free of the point and nonpoint sources that impact reduced quality waters, resulting in excellent water quality, fishing and recreational and aesthetic value. ERWs are similar to ORWs, but may be impacted by point or nonpoint source pollutants (Pike, 2000).

By designating these resource waters, the state wants to maintain the quality of the highest quality waters. Legislation can be passed using the above definitions to protect stream health, and future impacts to the few remaining high quality waters can be prevented through educational efforts.

Only ERWs, not ORWs, can be found in the BBT making their protection that much more important to the region. In a basin known for cold water streams and their recreation potential, negative impacts on water quality are magnified. By preventing these impacts on ERWs in the BBT, the quality, recreation, and aesthetic potential can be preserved and possibly improved upon.

Another rare waterbody type in the basin is the kettle lake. A few kettle lakes, sometimes called pothole lakes, were created in the basin by the glaciers thousands of years ago, all of them in Taylor County. Kettle lakes are important because they make up

most of the natural lakes in the basin. Most other basin lakes have been created with dams and other impounding structures, some originally constructed as many as 150 years ago or more.

Kettle lakes were created thousands of years ago during the recession of the glaciers. As the glaciers receded, large chunks of ice were deposited and then covered with sediment from the melting glacier. Later, as the ice chunks melted, the sediment covering them collapsed and created a hole, like a kettle or a pothole, in the ground. Today, these holes are filled with water and are slowly filling with sediment, as kettle lakes are known to do. Eventually, the sediment may become so deep that the lake fills in, vegetation grows, and the kettle hole is no longer a natural lake, but a bog or a swamp (Karrow, 1995).

*Channelization* – straightening of a stream, usually to irrigate or to drain fields.

*Point Source Pollution* – any contaminant discharge that enters a lake or stream at a specified point (for example, wastewater treatment facilities or factories).

*Nonpoint Source Pollution (NPS)* – any contaminant discharge entering a lake or stream unintentionally or at an unspecified point (for example, agricultural runoff or stormwater runoff).

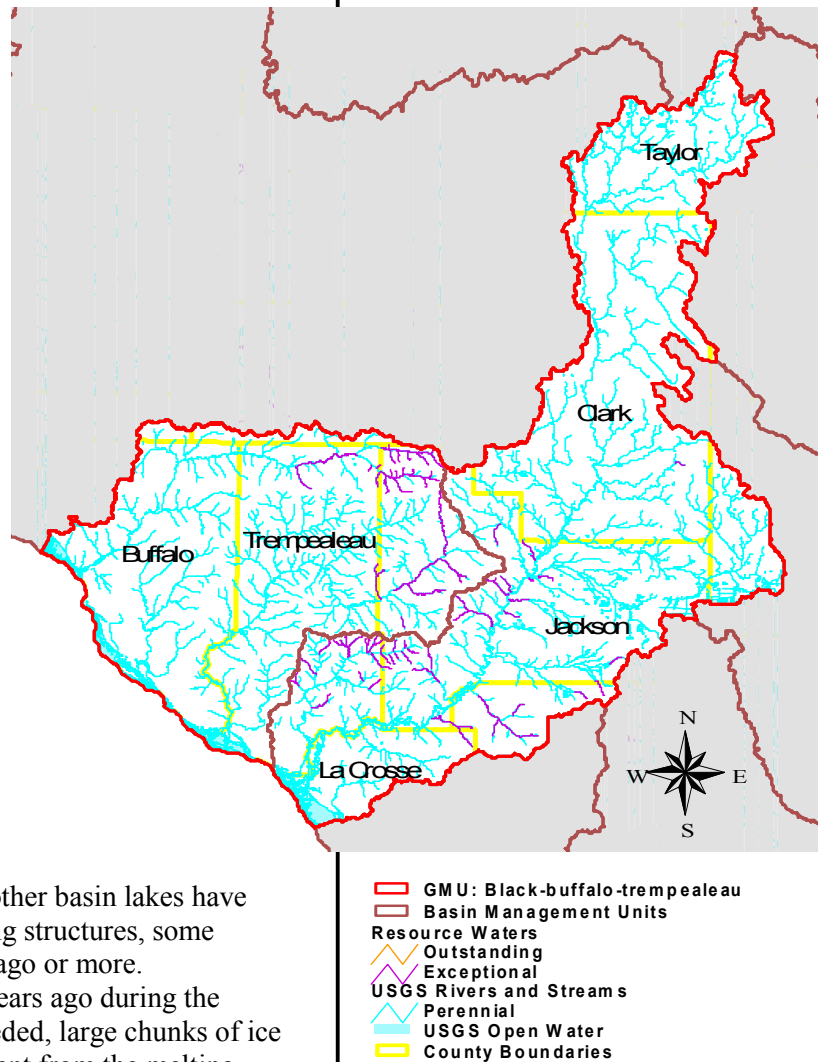


Figure 6 – Exceptional Resource Waters (ERWs) in the BBT

A large number of streams, and certain stretches of streams, designated as ERWs are found in the BBT. They are:

- ➔ Abraham Coulee Creek
- ➔ Allen Creek
- ➔ Bear Creek
- ➔ Big Creek
- ➔ Buffalo River
- ➔ Cisna Creek
- ➔ Clear Creek
- ➔ Columbus Creek
- ➔ Depot Creek
- ➔ Douglas Creek
- ➔ Dustin Creek
- ➔ Dutch Creek
- ➔ Indian Creek
- ➔ Joe Coulee Creek
- ➔ Johnson Valley Creek
- ➔ Kay Creek
- ➔ Levis Creek
- ➔ Little Creek
- ➔ North Branch Trempealeau River
- ➔ North Fork Buffalo River
- ➔ Pine Creek
- ➔ Sand Creek
- ➔ Skutley Creek
- ➔ Solam Creek
- ➔ Soper Creek
- ➔ South Fork Buffalo River
- ➔ Snow Creek
- ➔ Spencer Creek
- ➔ Squaw Creek
- ➔ Trempealeau River
- ➔ Tank Creek
- ➔ Vismal Creek
- ➔ Vosse Coulee Creek
- ➔ Washington Coulee Creek
- ➔ Wyman Creek
- ➔ and several unnamed creeks

### ***What the WDNR Is Doing***

Codes that were developed for managing Outstanding and Exceptional Resource Waters state that there should be no new discharge considerations for these waters, meaning that any new activities that may reduce water quality should not be allowed. However, if an activity threatens to reduce water quality but will significantly protect the public's health or will prevent another, more serious water quality problem, that activity could possibly be allowed. The WDNR must follow these codes and uphold them to the best of its ability in order to protect human health as well as the health of the waterbodies.

Some ways that they do this include advising potential dischargers of their rights and responsibilities regarding the ORWs and ERWs in their vicinity. They also work with private landowners to ensure that when they enhance their properties, they do not impact the high quality resource waters in their area by impounding water, filling nearby wetlands, or removing vegetation from streambanks or shorelines. The WDNR also educates the public whenever possible about the high quality resources available to them. If the public knows about and understands the resource, they can appreciate, respect, and protect it.

Like other lakes, the kettle lakes are monitored for things like dissolved oxygen levels, temperature, nutrients, metals, and other things that may tell water quality staff about the health of the waterbody. Keeping in mind the natural degradation of these lakes, if a problem is discovered through this monitoring where the gradual degradation of the lake is accelerated, measures can be taken to prevent further problems. Once again, education is the key to their protection and to the prevention of serious problems affecting these lakes.

### ***What You Can Do***

- ➔ Start a Lake Association or a Lake District. Find out more at <http://www.dnr.state.wi.us/org/water/fhp/lakes/>.
- ➔ Grants are available for protection, restoration, or improvement of water quality, like **Lake Grants** <http://www.dnr.state.wi.us/org/water/fhp/lakes/lkgrants.htm> and **River Planning and Protection Grants** <http://www.dnr.state.wi.us/org/water/fhp/rivers/index.htm>.
- ➔ If you own property bordering one or more exceptional resource waters, consider implementing some of the best management practices in this report located in "Managing Watersheds to Reduce Water Quality Impacts" starting on page 59.
- ➔ Teachers, find out about Project WILD Aquatic Education Guide by calling (850) 488-4679 or writing Project WILD, Office of Informational Services, Florida Fish & Wildlife Conservation Commission, 620 S. Meridian St., Tallahassee, FL 32399-1600.
- ➔ The Wetlands Reserve Program is a cost-sharing program for wetland restoration and wildlife habitat establishment. Contact the county NRCS office or visit <http://www.wi.nrcs.usda.gov/>.

## Rare Basin Species

The bald eagle is one success story. Although it remains on the federally threatened species list, it was removed from Wisconsin's endangered species list in 1989.

Yet, numerous lesser known plant and animal species and natural communities are still in danger. For many birds and mammals, the major threats seem to be fragmentation of habitat and over-hunting. Reptile and amphibian populations, in general, are weakened by shoreline alterations, habitat loss, and road kills. Numerous fish species cannot survive sedimentation and turbidity in streams, and dams are a huge obstacle to their reproductive patterns (*Vertebrate Species*, 1997). Plant species can be impacted by a wide variety of land and water management and quality issues.

Many of these threats can be removed or prevented, but not without help. For example, replanting vegetative borders would help reptiles, amphibians, and fish species. Protecting land in large tracts is beneficial to huge varieties of both plants and animals. Dam removal, while potentially expensive, is frequently less costly than dam maintenance and can return a stream to a state more conducive to natural fish reproduction.

The wood turtle has been threatened in the state since 1975 and is mostly found along forested streams in the northern and western two-thirds of the state. Wood turtles are considered semi-aquatic and prefer moderate to fast water with sand and gravel bottoms. Most believe that during late spring and early summer, they spend most of the time on land and return to the water in September and November, and that in winter they hibernate in community burrows. However, others believe some wood turtles remain in rivers year round.

Wood turtles can live as long as 58 years. A number of impacts like bank erosion, water pollution, and increased vehicle traffic on roads they might cross, can shorten this life span. Also, increased riprap use can destroy nesting sites. These impacts, combined with the presence of natural predators can reduce the turtles' already threatened population (*Vertebrate Species*, 1997).

Another protected rare species in the BBT is the gilt darter, a member of the perch family, which was listed as threatened in 1979. With an adult length of three inches and color variations of reds, greens, and blues, breeding male gilt darters are among the most beautiful fish in the state. Found in the Mississippi River basin and in medium-size streams drained by the Black River, this fish prefers clear, deep riffles and pools of large streams with mostly gravel, sand, and rubble substrates. In the Black River, most have been found in areas of shifting sand deltas, formed by feeding tributaries (Becker, 1983).

Sedimentation and the development of impoundments pose the most significant threats to gilt darters. These changes to habitat affect natural reproduction. Shoreland zoning and erosion prevention will likely be the best protections for the threatened gilt darter.

*Endangered Species* – plants and animals determined, based on scientific evidence, to be in danger of becoming extinct.

*Threatened Species* – animals and plants whose survival is impaired, but whose situation has not reached the stage of endangerment.

*Species of Special Concern* – those species whose survival is suspected to be in danger, though insufficient data has been gathered to warrant classification of threatened or endangered.



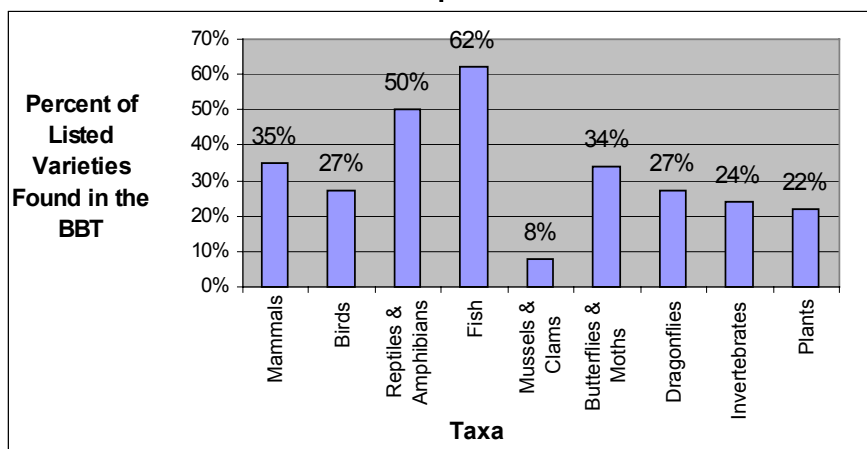
Courtesy of Bureau of Endangered Resources

When identifying a wood turtle, notice the yellow to orange color on its neck and front leg sockets. The turtle is medium-sized and has a rough, dull brown upper shell, displaying growth rings in the form of ridges that form a pyramid shape. The bottom shell is yellow with assorted black blotches.

A gilt darter has a stout, compressed body with a dark olive back spotted with unique, bright reds and blues. One noticeable characteristic is the presence of 6-8 "saddles" along its body. Its adult length is about 3 inches.



Figure 7 – Wisconsin's Endangered, Threatened, & Special Concern Species Found in the BBT; 27% of the species listed as endangered, threatened, or special concern in Wisconsin can be found in the BBT.



### What the WDNR Is Doing

The WDNR does what it can to combat threats to rare plant and animal species. Limitations exist to the ways some threats can be prevented. For example, the WDNR holds more than one million acres of public land on which wildlife can be protected or hunted, depending on the species. Some are small tracts while others are large

enough to support wildlife types needing a broad territory to survive. Public lands can also be used for educational purposes, providing opportunities for people to view rare species themselves.

**Waterway and Wetland**  
Permitting staff monitor structures in waterways and wetlands so that habitat for rare species is not damaged. Whenever possible, staff members encourage dam owners to remove impoundments and return streams and wetlands to their

original states, improving water quality and allowing for potential natural fish reproduction.

The WDNR also sets hunting limits for wild game. Most of these limits are set to maintain healthy population levels of game species. Hunters are prohibited from killing threatened and endangered species, unless it is to protect human life and, in some cases, property.

Wildlife biologists track and survey other species. Timber wolves, listed as state and federally endangered, are monitored using howling surveys and radio collars. Fishery biologists survey streams to learn what fish are surviving and reproducing there. In these ways, the WDNR can learn about the habits and habitats of fish and wildlife species and use this information to better protect them in the future.

### What You Can Do

- ➡ Check out *The Endangered and Threatened Vertebrate Species of Wisconsin* and *Guide to Wisconsin's Endangered and Threatened Plants* from the WDNR's Bureau of Endangered Resources. These guides can be used to make decisions about land use and management to promote the survival of rare plants and animals.
- ➡ Learn how you can protect natural communities in which rare species live. *Who to contact:* Land Owner Contact Specialist, (608) 267-9789.
- ➡ Receive e-mail updates about endangered resources – To subscribe, send an e-mail to <majordomo@badger.state.wi.us> and write "subscribe erprogram" or "subscribe erprogram-digest" in the body of your message.
- ➡ Provide economic support to the program by ordering an Endangered Resources license plate, adopting an eagle's nest, or donating on your taxes.
- ➡ Find DNR publications about rare species at <[http://www.dnr.state.wi.us/org/land/er/requesting\\_info.htm](http://www.dnr.state.wi.us/org/land/er/requesting_info.htm)>.

To learn more about rare plants and animals in your area and the natural communities that support them, visit: <<http://www.dnr.state.wi.us/org/land/er/rare.htm>>.

## Geologic Features

Underlying all of Wisconsin, including the BBT, is Precambrian crystalline bedrock. Some patches of Precambrian rock are exposed where stream erosion has cut through overlying rocks. An example is Precambrian rock that lies along the 40-mile segment of the Black River north of Black River Falls. During the end of the Precambrian era and at the start of the Cambrian Period (600 to 500 million years ago (mya)), wind and water erosion wore down the bedrock and created the major river valleys we have today.

In early Cambrian time, in what is now North America, an inland moving sea was approaching Wisconsin. Over millions of years, the sea spread across the continent finally reaching Wisconsin in the Late Cambrian Period over 500 mya. The sea, which advanced and receded several times during this period, deposited thick, flat layers of sandstone over the Precambrian granites. Cambrian sandstones make good aquifers and provide a source of drinking water for the southern portion of the BBT. Wind and water have eroded portions of the sandstone to form the distinctive sandstone mounds and buttes found in Jackson County.

The inland sea advanced during the Ordovician Period which started about 475 mya. This sea was warm and clear – ideal for development of corals. These corals became the limestone and dolomite layers that cap bluffs in the “driftless” area. The hilly driftless area, with its sandstone and dolomite exposures, contains mostly small farms and ridge side oak and maple woods. Small, wet meadows are sometimes associated with spring-fed “coulee” streams. An absence of young glacial deposits and nearly horizontal bedrock allowed major streams like the Black, Buffalo and Trempealeau Rivers and their tributaries time to develop a network of deep valleys and flat-topped narrow ridges.

No geologic record is present in the BBT until the final glacial advance started around 1 mya. As glaciers advanced from the northeast, they scraped off the marine sandstone and limestone layers that had been in northern Clark, Jackson, and Taylor counties, and redeposited these sediments as they melted. The geology of this part of the BBT consists of these deposited sands and gravels overlying the Precambrian crystalline bedrock. Drinking water in this area is drawn mainly from these glacially deposited sediments. Glacial meltwater also carried and deposited sediments in the Black, Buffalo and Trempealeau River valleys.

South of the BBT, Glacial Lake Wisconsin formed when the glacier dammed the outlet of the Wisconsin River. The Black River southwest of Hatfield served as an outlet channel for Glacial Lake Wisconsin until the receding ice allowed drainage to the south. As the ice retreated, the lake waters formed a new southern outlet carving the Dells of the Wisconsin River within a few days. Many Cambrian Sandstone mounds and buttes in Jackson County were once islands in Glacial Lake Wisconsin. A search around the base of many of these mounds shows evidence of an abandoned shoreline.

The BBT has two strikingly different landscapes.

- Watersheds in Taylor and Clark Counties have flat or rolling hills created by sediments left during the last glacial retreat.
- The landscape in Buffalo, Trempealeau, and Jackson Counties is dominated by “coulees,” steep-sided valleys flanked by limestone- or dolomite-capped, flat, rocky bluffs. This area is known as the “Driftless Area,” because no glacial deposits are present.

Most of the information to the left comes from “Wisconsin’s Foundations” by Gwen M. Schultz, 1986 and “Geology of Wisconsin and Upper Michigan” by Rachel and Richard Paull, 1977 (Chern, 2001).



Courtesy of Gerald Stetzer

Limestone quarry just off Highway 93 in Trempealeau County – between Centerville and Arcadia.

### *What the WDNR Is Doing*

For the WDNR, knowing the geology of the region is important for things like groundwater and drinking water. The geology of an area decides where and how deep to drill wells. For example, an aquifer in sandstone, which is water permeable, is easier to find than an aquifer in granite, which is impermeable to water. These same factors can determine the likelihood of well contamination in the event of a spill or a leaky storage tank.

Besides possible land or easement purchases of these bluffs to offer legal protection of these scenic formations, education will be a major component of their protection as well. Much can be learned about how they were formed, how they have changed over time, and how they continue to change.

As for preserving our unique geological resources, protection of the geology of the region is important. For example, scenic bluffs overlook the Mississippi River. These bluffs, rising up regularly like steep walls along the river, are made of sandstone topped with

limestone. They are among the geologic features being considered for protection in the Land Legacy List.

One place geological formations are already being protected is Perrot State Park in Trempealeau County. In Perrot State Park, trails lead to the tops of the bluffs for breathtaking views into and across the Mississippi River Valley. The Great River has been cutting away at these walls for many thousands of years and will likely continue for many thousands more.

### *What You Can Do*

- ➡ Learn about Wisconsin's geology and much more with the University of Wisconsin Extension's Wisconsin Geologic and History Survey. Sample maps and information are located at <http://www.uwex.edu/wgnhs/index.html>.
- ➡ Sites you might want to visit to see some of the BBT's geologic formations for yourself are:

**Mindoro Cut** – Following Highway 108 toward La Crosse, you will come to a large cut in a granite outcrop to make the ridge passable by road.

**Brady's Bluff** – Located in Perrot State Park, Brady's Bluff offers a great hiking and scenic opportunity.

**Sandstone bluffs** along the Black River – Canoe down the lower Black River to see high sandstone bluffs cut over generations by the water.

**Galesville Park** – Bluffs and caves can be found along the trails in this scenic park.

**Miscellaneous roadcuts** – Study the layers in roadcuts all over the area. Some particularly interesting ones are the Hixton Cut through which County Highway A and Interstate 94 pass in Jackson County and the Arcadia Ridge roadcuts found along Highway 93 in Trempealeau County.



Courtesy of Gerald Stetzer

The south end of the cut at Arcadia Ridge.



## Historical & Cultural Resources

The Ho-Chunk Nation, called the Winnebago by explorers entering Wisconsin in the 17<sup>th</sup> Century, were a nomadic tribe whose territory covered parts of Wisconsin, Minnesota, Illinois, and Iowa. The Ho-Chunk people traveled this four-state territory on foot and buried their dead along the trails. Traces of villages and campsites where they stayed and worked in gardens still remain.

To help them remember where important sites were, the Ho-Chunk shaped “marker trees.” Marker trees sometimes indicated gravesites, village sites, or springs. They also at times pointed out the direction of the trail or a low spot at which to cross the river.

The trees are being documented, since many are being destroyed by storms or being cut down by people who do not recognize their significance. Other Native American cultural resources, like burial sites, are also being documented and protected. The Ho-Chunk elders, who remember where many burial sites are, relay the information to the Ho-Chunk DNR office. The DNR staff then locates the sites and uses ground-penetrating radar (GPR) to determine, without disturbing the site, if there are remains under the ground. Once confirmed, these sites are mapped for use by the Ho-Chunk Nation. However, in order to protect sites from possible vandalism, the information is not released to the public.

At one time, mounds could be found scattered across the southern half of the state. Often times, they were burial sites or held artifacts like knives, beads, or pottery that tell archaeologists about the people who created them. Most of the mounds are gone today. Lacking modern equipment, early archaeologists leveled many of them to learn more about what was buried there.

One cluster of mounds that remains is found in Perrot State Park in Trempealeau County. As in other places, many of the mounds that stood where the park is now are gone, but a few remain. Those found in the park are conical (round), linear (long and narrow), or shaped like an animal.

Many questions still need to be answered about the mounds. What is known is that the people who built them were likely part of the Hopewell Culture or of the late Woodland Culture. Based on Carbon-14 dating techniques, it is estimated that these people date back as far as 4000 years ago. The mounds’ purpose and contents are still being studied, though the techniques have been refined.

The Mississippi Valley Archaeology Center (MVAC), working with the Ho-Chunk Heritage Preservation Office are using new technologies, like GPR, to study the mounds. With the new technology, archaeologists can look underground without ever using a shovel.

The mounds will continue to be protected in Perrot State Park. Also, ways to commemorate and educate people about them and other artifacts that have been destroyed are being considered. And, as always, investigations will go on as new questions arise.



Courtesy of the Ho-Chunk Nation

Marker tree; Tree saplings, usually oak, were bent over and tied parallel to the ground with woven rope or rawhide strips. As the trees grew, the trunks grew straight up beyond the tie. When the ties wore away, the trees were already deformed and they retained their angular shapes, like this tree in northern Monroe County near Highway 27.



### ***What the WDNR Is Doing***

Some WDNR projects require that ground must be disturbed. In an area with such a rich cultural history as western Wisconsin, it is important that when the land is to be disturbed, archaeologists be given time to determine if the area has some cultural significance. This is especially true of sites that are close to known or suspected significant sites. So, the WDNR allows time in certain work plans for state archaeologists to study the area in question. If it is found to have historical or cultural significance, then the WDNR holds off on the project until the archaeologists are finished studying the site or holds off indefinitely if the site holds extreme significance.

One site that is protected by the WDNR on state land is the mounds found in Perrot State Park. Park staff allows qualified agencies and individuals to study the mounds. They protect the location of the mounds in order to prevent stealing and damage to the mounds or their contents. In this way, the mounds will remain intact for many more years of archaeological research about the people who constructed them.

Instead of showing the mounds to the public, Perrot State Park has a Nature Center that is dedicated to educating visitors about the park. Displays not only explain things like the wildlife and geology of the area, but also tell visitors more about the mounds and what has been learned about their cultural history.

### ***What You Can Do***

- ➡ If you have what you believe to be a marker tree on your property, please call Bill Kingswan with the Ho-Chunk Nation's Division of Natural Resources. He is taking photos of the trees as well as recording their locations and what they are marking. He can be contacted at (800) 294-9343, ext. 1106.
- ➡ For more information about the archaeology of the Trempealeau area, visit the Nature Center at Perrot State Park or visit the Mississippi Valley Archaeology Center (MVAC) web site at <<http://www.uwlax.edu/Colleges/mvac/>>.
- ➡ To learn more about archaeology in Wisconsin, go to the web site of the Wisconsin Archaeological Society at <<http://www.uwm.edu/Org/WAS/>>.
- ➡ For more information about the Ho-Chunk Nation, please visit their web-site <<http://www.ho-chunknation.com>>.
- ➡ Visit Perrot State Park's Nature Center to learn about the mounds found in the park.

## Controlling Invasive Species

Probably the best-known invasive species in recent times is the zebra mussel, which has made its assault on Wisconsin lakes and streams in recent years. Zebra mussels are native to the fresh waters of western Russia, near the Caspian Sea, but this is not what makes them “invasive.” This title is saved for plants and animals that are so well adapted to certain natural communities that they are able to out-compete most other species.

When invasives like zebra mussels and Eurasian water milfoil, an invasive species of aquatic plant, have taken hold in a community, it can be difficult to control their spread. Warning signs asking boaters and other water users to check their trailers and water craft for signs of these species as well as flush their systems before leaving the water’s edge are being put up all over the state. These measures are especially important in a basin like the BBT where these invasives are not yet found, but where the threat is imminent because of its connection to the Mississippi River.

Zebra mussels and Eurasian water milfoil are certainly not the only invasive species, but they do provide a valuable pattern for everyone to follow for control:

- ➡ *Step 1:* Be able to identify invasive species in areas where you live or recreate, or if they cannot be seen, know where they might hide.
- ➡ *Step 2:* Understand control measures required to contain invasive species.
- ➡ *Step 3:* Take the necessary steps to prevent the spread of invasives or remove the invasives when and wherever possible.

Being able to recognize some invasives can be difficult. For example, some invasive species, like reed canary grass, resemble other native and non-native plants. Reed canary grass is large, coarse, and very adaptable to upland habitats, partial shade, and most types of wetlands, though it prefers to moist wetlands, disturbed areas, and full sun.

It spreads in two ways, by seed or by creeping rhizomes. To make matters worse, if the root system is cut, each root becomes a new system, creating an even thicker mat of canary grass than before. These stands of grass leave little habitat for other species, little diversity in the area, and little value for wildlife.

When people are absolutely certain of the grass species, then control measures can be taken. In natural communities, mechanical practices, like black plastic to smother the plants, prescribed burns, mowing and cultivation, are best because they have the least impact on other species in the area. In buffer areas and on disturbed ground, chemical and mechanical means can be combined for an even greater effect. Herbicides should be used very carefully to prevent damage to other non-target species (“Reed,” 1999).

The 2001 budget bill included \$300,000 to start an aquatic invasive species program in the state. It also includes legislation making it illegal to launch a boat carrying either zebra mussels or Eurasian water milfoil.

*Rhizomes* – a horizontal, usually underground stem that often sends out roots and shoots from its nodes.



Reed canary grass.

Ways to control invasives vary from species to species and habitat to habitat. Control methods should be chosen based on their effectiveness and their minimal impact on the habitat being protected:

- ➡ Hand or mechanical pulling
- ➡ Herbicides and pesticides
- ➡ Biocontrols (natural predators, etc.)
- ➡ Controlled burning
- ➡ Mowing and cultivation
- ➡ Flooding

Take care not to spread invasive species.

- ➡ Clean water crafts and trailers thoroughly before leaving the water's edge.
- ➡ Practice wise gardening by not planting invasive or quick-spreading species and planting native species whenever possible.

### ***What the WDNR Is Doing***

Natural areas, wildlife areas, and fishery areas have all been designated to protect key species and natural communities. In the 31 fishery and wildlife areas in the BBT, the WDNR encourages the growth of native plants, and in doing that, encourages the survival of natural communities and the species that depend on them. One way that the WDNR encourages growth of native species is by discouraging the spread of invasive species that can compete with and sometimes crowd out native species.

In these areas, ways to control invasive species vary based on the species and the natural community in which it is found. Biologists choose the best method to control the invasive without significantly impacting the native species or the community. Methods of control include cultural, biological, mechanical, chemical, or a combination of these. Mechanical and chemical controls rely on artificial means like digging up the ground and using herbicides or pesticides, while biological controls involve using natural predators to control an invasive population. Experiments using insects to control purple loosestrife and leafy spurge are underway at the Trempealeau and Upper Mississippi River national wildlife refuges.

Cultural controls require change in human actions to stop the spread of invasive species. Cultural controls also require education. The WDNR works through workshops, brochures, and educational programs to tell people about the importance of control of invasives. Not only do invasives impact native species, rare species, and natural communities, they can frequently encroach on yards and gardens, forests, and farmers' fields. They also cost a great deal of money to control. It is in everyone's best interest to understand prevention methods as well as cost effective control methods after a species has "invaded" (*Control Recommendations*, 1997).

### ***What You Can Do***

- ➡ Check out the *Wisconsin Manual of Control Recommendations for Ecologically Invasive Plants*, put out by the WDNR in 1997. The information from this manual is available at <[http://www.dnr.state.wi.us/org/land/er/invasive/manual\\_TOC.htm](http://www.dnr.state.wi.us/org/land/er/invasive/manual_TOC.htm)>.
- ➡ To learn more about invasive and native plants in Wisconsin, visit <<http://www.dnr.state.wi.us/org/land/er/invasive/info/avoid.htm>>.
- ➡ To find out about methods of control, please go to <<http://www.dnr.state.wi.us/org/land/er/invasive/links.htm>>.
- ➡ Volunteer to help remove invasive species from public lands with conservation organizations like The Nature Conservancy. Find out how at <<http://tncweeds.ucdavis.edu/howhelp.html>>.
- ➡ Participate in purple loosestrife control measures – citizens and school groups. For more information, call (608) 221-6349 or (608) 267-5066 or write to Purple Loosestrife Biocontrol Project, DNR Research Center, 1350 Femrite Drive, Monona, WI 53716.
- ➡ To learn more about invasive species and to get involved in control activities in the southern section of the basin, call (608) 388-5766.

## References

- Becker, George C. 1983. *Fishes of Wisconsin*. University of Wisconsin Press: London.
- Conversation with Ritchie Brown. August 30, 2001. Ho-Chunk Nation, Division of Natural Resources.
- E-mail from Laura Chern. December 18, 2001. Wisconsin Department of Natural Resources, Bureau of Drinking Water & Groundwater.
- Eckstein, Ronald and Bruce Moss. 1995. "Oak and Pine Barrens Communities." *Wisconsin's Biodiversity as a Management Issue: A Report to Department of Natural Resources Managers*. Wisconsin Department of Natural Resources: Madison.
- Finan, Ann-Marie, Ed. 2000. *Wisconsin Forests at the Millennium: an Assessment*. Wisconsin Department of Natural Resources: Madison.
- Henderson, Richard. 1995. "Oak Savanna Communities." *Wisconsin's Biodiversity as a Management Issue: A Report to Department of Natural Resources Managers*. Wisconsin Department of Natural Resources: Madison.
- E-mail from Randy Hoffman. October 12, 2001. Wisconsin Department of Natural Resources, Bureau of Endangered Resources.
- Karrow, Paul F. May, 1995. "Kettle Holes." <<http://www.sciborg.uwaterloo.ca/earth/waton/kettle.html>>. *Wat on Earth*. Volume 8, No. 2.
- E-mail from Ronald Martin. November 12, 2001. Wisconsin Department of Natural Resources, Bureau of Endangered Resources.
- Mississippi Valley Archaeology Center. "Archaeology in the Trempealeau Area." Brochure.
- Pike, Janel. 2000. "Notes for 'oewlw91c,' Outstanding and Exceptional Resource Waters." Notes for GIS layer. Wisconsin Department of Natural Resources.
- Conversation with Patrick Sorge. November 26, 2001. Wisconsin Department of Natural Resources, Bureau of Watershed Management.
- Wisconsin Department of Natural Resources, Bureau of Endangered Resources. 1997. *The Endangered and Threatened Vertebrate Species of Wisconsin*.
- . 1999. "Reed Canary Grass fact sheet." <<http://www.dnr.state.wi.us/org/land/er/invasive/factsheets/reed.htm>>.
- . 1997. *Wisconsin Manual of Control Recommendations for Ecologically Invasive Species*. <[http://www.dnr.state.wi.us/org/land/er/invasive/manual\\_TOC.htm](http://www.dnr.state.wi.us/org/land/er/invasive/manual_TOC.htm)>.
- . 2001. "Natural Heritage Inventory On-line Database." <[http://www.dnr.state.wi.us/org/land/er/nhi/NHI\\_ims/onlinedb.htm](http://www.dnr.state.wi.us/org/land/er/nhi/NHI_ims/onlinedb.htm)>.
- Wisconsin Department of Natural Resources, GIS Team. 1994. "User Advisory Notice for Resource Waters." Madison.
- Wisconsin Department of Natural Resources, Wetland Team. 2000. *Reversing the Loss: A Strategy for Protecting & Restoring Wetlands in Wisconsin*. Madison.